

# **AFRL Missile Propulsion Technology**

**Draft 19 July 2002**



Material for Maj Gen Nielsen's  
Missile Technology presentation  
at the 5th annual Space and  
Missile Defense Conference in  
Huntsville, on 21 August 2002

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FILE

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31 July 2002

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5<sup>th</sup> Annual Space & Missile Defense Conference  
(Huntsville, AL, 21 August 2002) (Deadline: ASAP, per Dr. Corley)

(Statement A)

# REPORT DOCUMENTATION PAGE

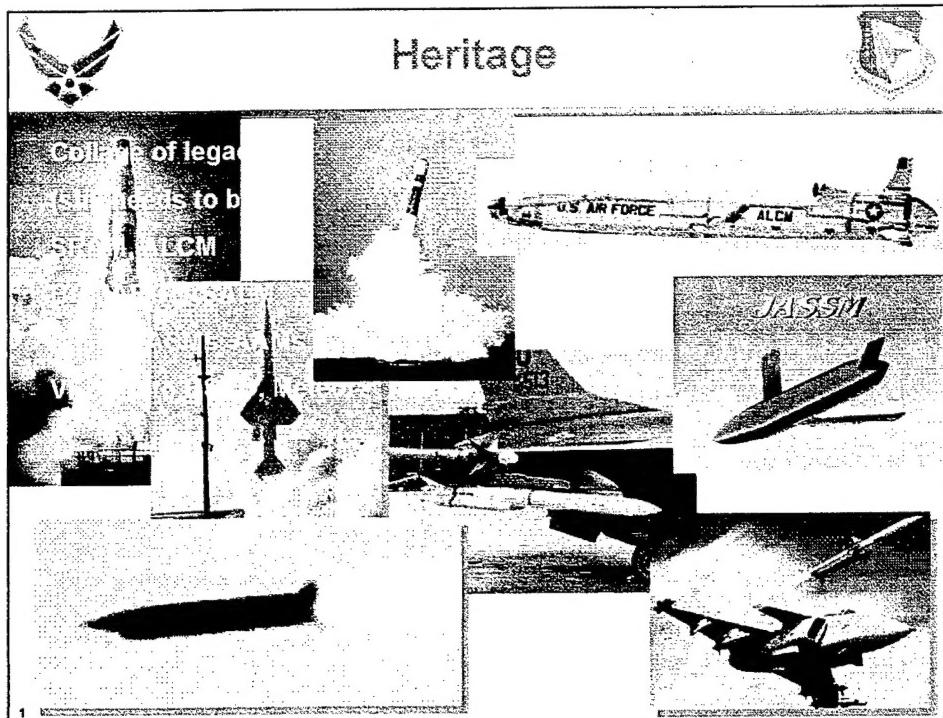
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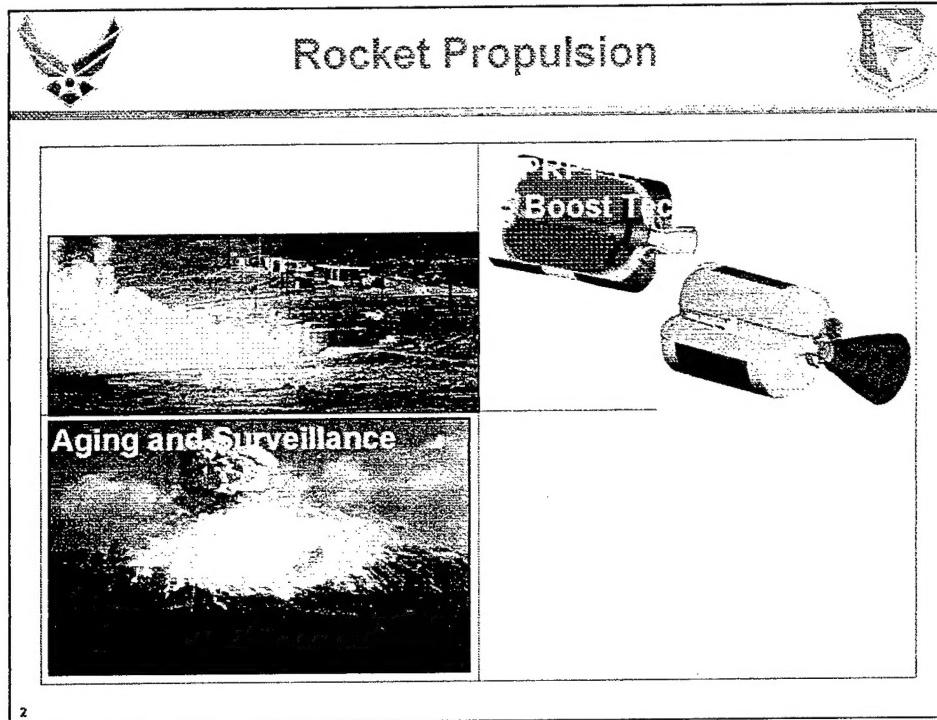
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41 items enclosed



AFRL's engineers and scientists (and their predecessors) have developed the propulsion technology used in many different missile systems.

- Rocket propulsion has been critical to the success of our strategic force since the 1950's. The liquid fuel engines used in the early Thor, Atlas and Titan missiles were developed and tested at our Edwards AFB site. We also developed and/or demonstrated the solid rocket motor technologies for the Minuteman, Peacekeeper, and Small ICBM programs.
- Technology developed by AFRL/PR has a tremendous impact on non-Air Force ballistic missiles. Among these are the Navy Poseidon, Trident I, and Trident II submarine launched ballistic missiles (SLBMS) and the Army Pershing II Theater Ballistic Missile (TBM).
- On a smaller scale, we have developed and demonstrated the rocket propulsion technologies used in smaller systems such as the AMRAAM, Sidewinder, Maverick, and HARM.
- The efficient, small gas turbines used in the Air Launched Cruise Missile were developed by our labs. The more modern expendable turbojets and turbofans are a direct result of the AF's participation in the DoD-led IHPTET program.
- Initially developed in the 1950's, ramjet engines powered the BOMARC interceptor missile and the D-21 supersonic drone. Breakthroughs in the '60's and '70's led to the integral rocket ramjet, successfully demonstrated in the Mach 4+ Advanced Strategic Air Launched Missile.
- The latest combination of rocket and ramjet technology is the Variable Flow Ducted Rocket. Ground-demonstrated in an AMRAAM-size class, this technology is transitioning via the Navy's High Speed ARM Demonstration and the European Meteor AAM.



AFRL's rocket propulsion work is a key component of the DoD-led Integrated High Payoff Rocket Propulsion Technology (IHPRPT) program. Most of our missile propulsion technology is focused on large strategic missile systems. Beginning in 1996, the IHPRPT goal is to double propulsion capability by the year 2010.

- The IHPRPT Phase I Solid Boost Demonstrator Program demonstrated new technologies in the case, propellant, nozzle, and control technologies in a 92 inch diameter, 120,000 pound class motor. These technologies reduce the cost 15% of solid rockets while improving the performance 15% and reliability 25%.
- The second phase of the IHPRPT program is further reducing the cost of solid rockets, while simultaneously increasing their performance and reliability. The rocket motors illustrated in the upper right corner feature the latest technologies for the case, propellant, nozzle, and control systems.
- Advanced diagnostic systems are critical to avoiding spectacular failures. Our Aging and Surveillance program develops technology for the sustainment of our strategic missile systems to enable improved strategic system capabilities, reduce system cost, and sustain the capabilities needed to develop future systems.
- Not all of our work is focused on large strategic systems. Working together, the Propulsion and Munitions directorates have developed reaction jet control technologies for air-to-air missiles. *Mike Valentino (Eglin) is sending a video of the MCT test.*